

Appl. No. 10/050,373

11. (Amended) A method of forming a nitrogen-enriched region within a

SUB
C17 silicon-oxide-containing layer, comprising:

providing the silicon-oxide-containing layer over a substrate; the layer having an upper surface above the substrate and a lower surface on the substrate;

8 exposing the layer to activated nitrogen species from a nitrogen-containing plasma to introduce nitrogen into the layer and form a nitrogen-enriched region, the nitrogen enriched region being only in an upper half of the silicon-oxide-containing layer; and

thermally annealing the nitrogen within the nitrogen-enriched region to bond at least some of the nitrogen to silicon proximate the nitrogen; the nitrogen-enriched region remaining confined to the upper half of the silicon-oxide-containing layer during the annealing; the thermal annealing comprising rapid thermal processing at a ramp rate of at least about 50°C/sec to a process temperature of less than 1000°C, with the process temperature being maintained for at least about 30 seconds.

Appl. No. 10/050,373

48. (New) A method of forming a nitrogen-enriched region within a silicon-

SUB 7
C1 oxide-containing layer, comprising:

providing the silicon-oxide-containing layer over a substrate; the layer having an upper surface above the substrate and a lower surface on the substrate;

82 exposing the layer to activated nitrogen species from a nitrogen-containing plasma to introduce nitrogen into the layer and form a nitrogen-enriched region, the nitrogen enriched region being only in an upper half of the silicon-oxide-containing layer; and

thermally annealing the nitrogen within the nitrogen-enriched region to bond at least some of the nitrogen to silicon proximate the nitrogen; the nitrogen-enriched region remaining confined to the upper half of the silicon-oxide-containing layer during the annealing; the thermal annealing comprising thermal processing at a temperature of about 700°C for a time of about 30 seconds.

Appl. No. 10/050,373

Sub C17
49. (New) A method of forming a nitrogen-enriched region within a silicon-oxide-containing layer, comprising:

providing the silicon-oxide-containing layer over a substrate; the layer having an upper surface above the substrate and a lower surface on the substrate;

exposing the layer to activated nitrogen species from a nitrogen-containing plasma to introduce nitrogen into the layer and form a nitrogen-enriched region, the nitrogen enriched region being only in an upper half of the silicon-oxide-containing layer; and

thermally annealing the nitrogen within the nitrogen-enriched region to bond at least some of the nitrogen to silicon proximate the nitrogen; the nitrogen-enriched region remaining confined to the upper half of the silicon-oxide-containing layer during the annealing; the thermal annealing comprising thermal processing at a temperature of about 1050°C for a time of about 5 seconds.